

Application Serial No. 09/636,571
Reply to Office Action of June 19, 2008

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PATENT
Docket: CU-6003

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Amendments to the Claims

The listing of claims presented below replaces all prior versions, and listings, of claims in the application.

Listing of claims:

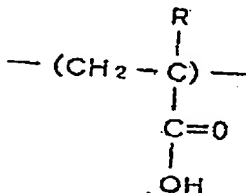
1. – 65. (Cancelled)
66. (Previously Presented) A production method for a highly stable polymer comprising the steps of reacting a polymer having a principal chain including at least a component unit having an acidic group and a component unit having a hydroxyl group with an isocyanate compound until an isocyanate group, as measured by an IR absorption spectrum at a peak of $2,200\text{cm}^{-1}$, is no longer present, and then adding an alcohol, before viscosity rise of the solution or before completion of viscosity rise of the solution, to a reaction product and thereby reacting the alcohol with acid anhydride groups of the reaction product, wherein the acid anhydride groups are generated in the production method by dehydration of un-reacted acidic groups.
67. (Previously Presented) The production method for a highly stable polymer according to claim 66, wherein the alcohol is added to the solution of the polymer obtained by reacting the polymer and the isocyanate compound dissolved or dispersed in a solvent before viscosity rise of the solution or before completion of viscosity rise of the solution.
68. (Previously Presented) The production method for a highly stable polymer according to claim 67, wherein the polymer applied with the alcohol treatment are left or heated for a predetermined time for maturation after the addition of the alcohol.
69. (Previously Presented) The production method for a highly stable polymer according to claim 68, wherein the polymer is matured at 30 to 170°C for a period within 72 hours.
70. (Previously Presented) The production method for a highly stable polymer according to claim 66, wherein the principal chain of the polymer comprises at least

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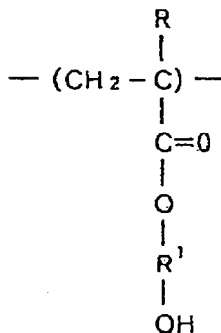
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a component unit represented by the below-mentioned formula (1) and a component unit represented by the below-mentioned formula (2):

Formula (1)



Formula (2)



wherein R is hydrogen or an alkyl group having 1 to 5 carbon atoms, R¹ is an alkylene group having 2 to 4 carbon atoms.

71. (Previously Presented) The production method for a highly stable polymer according to claim 66, wherein the isocyanate compound has a reactive group other than the isocyanate group.

72. (Previously Presented) The production method for a highly stable polymer according to claim 71, wherein the isocyanate group is a radical polymerizable group-containing isocyanate compound.

73. (Previously Presented) The production method for a highly stable polymer according to claim 66, wherein a compound having a double bond-containing group

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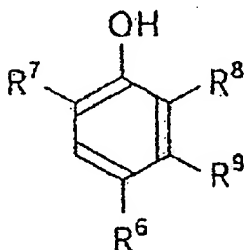
and an acidic functional group is reacted with a compound having a double bond-containing group and a hydroxyl group, using a non-nitrile azo-based polymerization initiator or a peroxide-based polymerization initiator so as to prepare the polymer, and the polymer is reacted with the isocyanate compound.

74. (Previously Presented) The production method for a highly stable polymer according to claim 73, wherein a highly stable resin with the light transmittance of a 3-methoxy butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 400 nm being 60% or more is obtained.

75. (Previously Presented) The production method for a highly stable polymer according to claim 73, wherein a highly stable resin with the light transmittance of a 3-methoxy butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 360 nm being 50% or more is obtained.

76. (Currently Amended) The production method for a highly stable polymer according to claim 66, wherein the isocyanate compound is reacted with the polymer, using a polymerization inhibitor selected from the group consisting of a phenol-based compound represented by the below-mentioned formula (10) and a phosphite-based compound represented by the below-mentioned formula (16):

Formula (10)

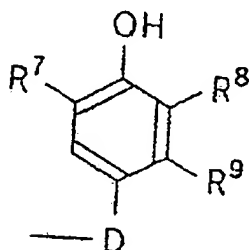


wherein R⁶ is hydrogen, an alkyl group having 1 to 5 carbon atoms, or the below-mentioned formula (11):

Formula (11)

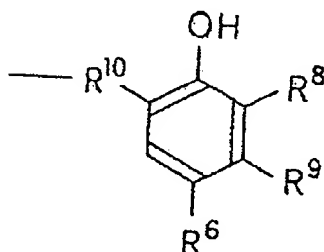
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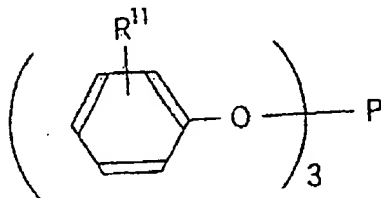
wherein D in the formula (11) is $-S-$, an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R^7 is hydrogen or an alkyl group having 1 to 10 carbon atoms R^8 is hydrogen, an alkyl group having 1 to 10 carbon atoms, or the below:

Formula (12)



wherein R^{10} in the formula (12) is a alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R^9 is hydrogen or an alkyl group having 1 to 10 carbon atoms, however, at least one of R^7 and R^8 is a tert-butyl group, or an alkyl group having a cyclohexyl group. ~~Moreover,~~ and substituents of the numeral can either be same or different,

Formula (16)



wherein R^{11} is hydrogen or an alkyl group having 1 to 20 carbons atoms.

77. (Previously Presented) The production method for a highly stable polymer according to claim 76, wherein a highly stable resin with the light transmittance of a 3-methoxyl butyl acetate solution of a 20% by weight resin solid component placed in

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a 1 cm square quartz cell at 400 nm being 60% or more is obtained.

78. (Previously Presented) The production method for a highly stable polymer according to claim 76, wherein a highly stable resin with the light transmittance of a 3-methoxyl butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 360 nm 50% or more is obtained.

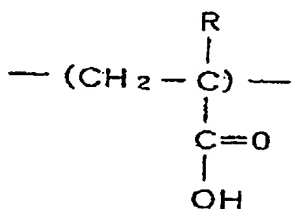
79. (Cancelled).

80. (Previously Presented) The hardenable resin composition according to claim 103, wherein the hardenable polymer is obtained by reacting the polymer with the isocyanate compound and the alcohol, and further being left or heated for a predetermined time for maturation.

81. (Previously Presented) The hardenable resin composition according to claim 103, containing as the essential component the hardenable polymer dissolved or dispersed in a coating solvent, wherein the hardenable polymer is obtained by reacting the polymer with the isocyanate compound, and further reacting the same with, an alcohol having a boiling point with a 75°C or less difference with respect to the boiling point of the coating solvent to be used and/or an evaporation rate with a 90 (n-BuOAc=100) or less difference with respect to the evaporation rate of the coating solvent.

82. (Previously Presented) The hardenable resin composition according to claim 103 wherein, the principal chain of the polymer comprises at least a component unit represented by the below-mentioned formula (1) and a component unit represented by the below-mentioned formula (2):

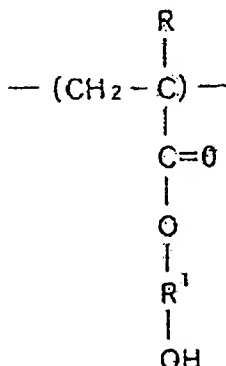
Formula (1)



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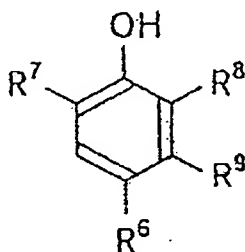
Formula (2)



wherein R is hydrogen or an alkyl group having 1 to 5 carbon atoms, R¹ is an alkene group having 2 to 4 carbon atoms, and the isocyanate compound is a radical polymerizable group-containing isocyanate compound.

83. (Previously Presented) The hardenable resin composition according to claim 103, wherein the polymer is formed by polymerization of a compound having a double bond-containing group and an acidic functional group with a compound having a bond-containing group and a hydroxyl group, using a non-nitrile azo-based polymerization initiator or peroxide-based polymerization initiator, and the polymer is reacted with the isocyanate compound, using a polymerization inhibitor selected from the group consisting of a phenol-based compound represented by the below-mentioned formula (10) and a phosphite-based compound represented by the below-mentioned formula (16):

Formula (10)

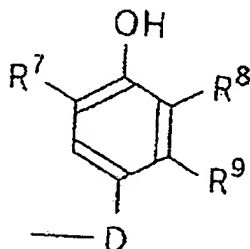


wherein R⁶ is hydrogen, an alkyl group having 1 to 5 carbon atoms, or the below-mentioned formula (11):

Formula (11)

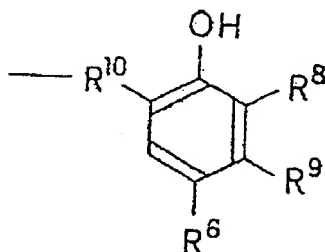
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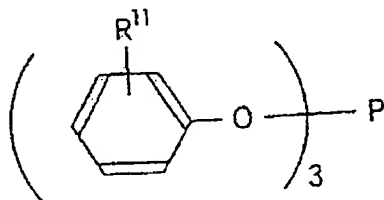
wherein D in the formula (11) is $-S-$, an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R^7 is hydrogen or an alkyl group having 1 to 10 carbon atoms, R^8 is hydrogen, an alkyl group having 1 to 10 carbon atoms, or the below-mentioned formula (12):

Formula (12)



wherein R^{10} in the formula (12) is an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R^9 is hydrogen or an alkyl group having 1 to 10 carbon atoms, however, at least one of R^7 and R^8 is tert-butyl group, or an alkyl group having a cyclohexyl group, moreover, substituents of the same numeral can either be same or different,

Formula (16)



wherein R^{11} is hydrogen or an alkyl group having 1 to 20 carbon atoms.

84. (Previously Presented) The hardenable resin composition according to claim 83, wherein the hardenable resin polymer has a light transmittance of a 3-methoxy butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square

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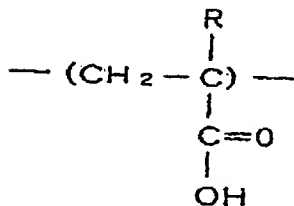
cell at 400 nm being 60% or more.

85. (Previously Presented) The hardenable resin composition according to claim 83, wherein the hardenable resin polymer has a light transmittance of a 3-methoxy butyl acetate solution of 20% by weight resin solid component in a 1 cm square quartz cell at 360 nm being 50% or more.

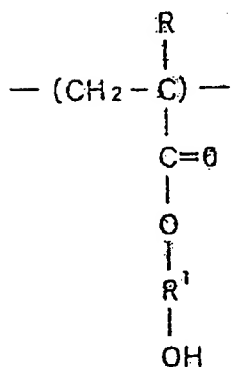
86. (Cancelled).

87. (Previously Presented) The production method for a hardenable resin composition according to claim 105, wherein the principal chain of the polymer comprises at least a component unit represented by the below-mentioned formula (1) and a component unit represented by the below-mentioned formula (2):

Formula (1)



Formula (2)



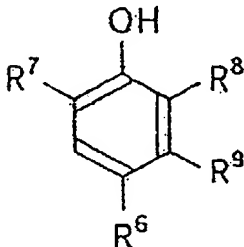
wherein R is hydrogen or alkyl group having 1 to 5 carbon atoms, and R¹ is an alkylene group having 2 to 4 carbons atoms, the isocyanate compound is a radical polymerizable group-containing isocyanate compound, and the polymer is matured at 30 to 170°C for a period within 72 hours.

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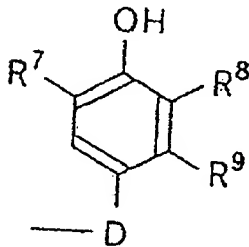
88. (Previously Presented) The production method for a hardenable resin composition according to claim 105, wherein the polymer is prepared by polymerization of a compound having a double bond-containing group and an acidic functional group with a compound having a double bond-containing group and a hydroxyl group, using a non-nitrile azo-based polymerization initiator or a peroxide-based polymerization initiator, and the polymer is reacted with the isocyanate compound, using a polymerization inhibitor selected from the group consisting of a phenol-based compound represented by the below-mentioned formula (10) and a phosphite-based compound represented by the below-mentioned formula (16):

Formula (10)



wherein R⁶ is hydrogen, an alkyl group having 1 to 5 carbon atoms, or the below-mentioned formula (11):

Formula (11)

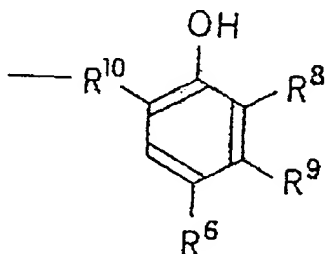


wherein D in the formula (11) is —S—, an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R⁷ is hydrogen or an alkyl group having 1 to 10 carbon atoms, R⁸ is hydrogen, an alkyl group having 1 to 10 carbon atoms, or the below-mentioned formula (12):

Formula (12)

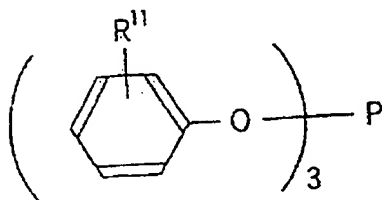
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wherein R^{10} in the formula (12) is an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbons atoms, R^9 is hydrogen or an alkyl group having 1 to 10 carbon atoms, however, at least one R^7 and R^8 is a tert-butyl group, or an alkyl group having a cyclohexyl group, moreover, substituents of the same numeral can either be same or different

Formula (16)



wherein R^{11} is hydrogen or an alkyl group having 1 to 20 carbon atoms.

89. (Previously Presented) The production method for a hardenable resin composition according to claim 88, wherein a polymer having a light transmittance of a 3-methoxy butyl acetate solution of a 20% by weight resin solid component placed in a 1cm square quartz cell at 400nm being 60% or more is prepared by reacting the polymer with an isocyanate compound, and applying the alcohol treatment to the polymer.

90. (Previously Presented) The production method for a hardenable resin composition according to claim 88, wherein a polymer having a light transmittance of 3-methoxy butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 360 nm being 50% or more is prepared by reacting the polymer with an isocyanate compound, and applying the alcohol treatment to the polymer.

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91-98. (Cancelled).

99. (Currently Amended) A highly stable polymer comprising a polymer ~~obtainable~~ obtained by reacting a polymer having a principal chain including at least a component unit having an acidic group and a component unit having a hydroxyl group with an isocyanate compound until an isocyanate group, as measured by an IR absorption spectrum at a peak of $2,200\text{cm}^{-1}$, is no longer present, and then adding an alcohol to a reaction product, before viscosity rise of the solution or before completion of viscosity rise of the solution, and thereby reacting the alcohol with acid anhydride groups of the reaction product, wherein the acid anhydride groups are generated by dehydration of un-reacted acidic groups, wherein the highly stable polymer contains substantially no acid anhydride group.

100. (Currently Amended) A highly stable polymer comprising a polymer ~~obtainable~~ obtained by reacting a polymer having a principal chain including at least a component unit having an acidic group and a component unit having a hydroxyl group with an isocyanate compound until an isocyanate group, as measured by an IR absorption spectrum at a peak of $2,200\text{cm}^{-1}$, is no longer present, and then adding an alcohol to a reaction product, before viscosity rise of the solution or before completion of viscosity rise of the solution, and thereby reacting the alcohol with acid anhydride groups of the reaction product, wherein the acid anhydride groups are generated by dehydration of un-reacted acidic groups, wherein at least a part of the component unit having an acidic group the component unit having a hydroxyl group and other component units included in the principal chain contains a benzene ring, and wherein the allowable amount of the acid anhydride is such that the area ratio represented by the acid anhydride group ($1,783$ to $1,822\text{ cm}^{-1}$)/benzene ring (683 to 721 cm^{-1}) is 0.03 or less by the FT-IR spectrum.

101. (Cancelled).

102. (Currently Amended) The hardenable resin composition according to claim 103, containing as the essential component the highly stable polymer ~~obtainable~~ obtained by reacting the alcohol before viscosity rise of a reaction liquid obtained by reacting

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the isocyanate compound or before completion of viscosity rise of the solution.

103. (Currently Amended) A hardenable resin composition containing as the essential component a highly stable polymer ~~obtainable~~ obtained by reacting a polymer having a principal chain including at least a component unit having an acidic group and a component unit having a hydroxyl group with an isocyanate compound having a hardenable reactive group until an isocyanate group, as measured by an IR absorption spectrum at a peak of $2,200\text{ cm}^{-1}$, is no longer present, and then adding an alcohol to a reaction product, before viscosity rise of the solution or before completion of viscosity rise of the solution, and thereby reacting the alcohol with acid anhydride groups of the reaction product, wherein the acid anhydride groups are generated in the production method by dehydration of un-reacted acidic groups, wherein the highly stable polymer contains substantially no acid anhydride group.

104. (Currently Amended) A hardenable resin composition containing as the essential component a highly stable polymer ~~obtainable~~ obtained by reacting a polymer having a principal chain including at least a component unit having an acidic group and a component unit having a hydroxyl group with an isocyanate compound having a hardenable reactive group until an isocyanate group, as measured by an IR absorption spectrum at a peak of $2,200\text{ cm}^{-1}$, is no longer present, and then adding an alcohol to a reaction product, before viscosity rise of the solution or before completion of viscosity rise of the solution, and thereby reacting the alcohol with acid anhydride groups of the reaction product, wherein the acid anhydride groups are generated in the production method by dehydration of un-reacted acidic groups, wherein at least a part of the component unit having the acidic group, the component unit having a hydroxyl group and the other component units included in the principal chain of the highly stable polymer contains a benzene ring, and wherein the allowable amount of the acid anhydride group of the highly stable polymer is such that the area ratio represented by the acid anhydride group ($1,783\text{ to }1,822\text{ cm}^{-1}$)/benzene ring ($683\text{ to }721\text{ cm}^{-1}$) is 0.03 or less by the FT-IR spectrum.

105. (Previously Presented) A production method for a hardenable resin composition comprising the steps of reacting a polymer having a principal chain including at least

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a component unit having an acidic group and a component unit having a hydroxyl group with an isocyanate compound having a hardenable reactive group until an isocyanate group, as measured by an IR absorption spectrum at a peak of $2,200\text{ cm}^{-1}$, is no longer present to form an intermediate product, preparing a solution by dissolving or dispersing the intermediate product in a solvent, adding an alcohol to the solution before the viscosity rise of the solution or before completion of viscosity rise of the solution, the solution including a reaction product, thereby reacting the alcohol with acid anhydride groups of the reaction product, wherein the acid anhydride groups are generated in the production method by dehydration of un-reacted acidic groups, and leaving or heating the intermediate product applied with the alcohol treatment for a predetermined time for maturation.

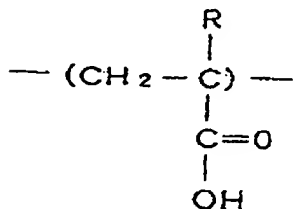
106. (Previously Presented) A production method for a hardenable resin composition comprising the steps of reacting a polymer having a principal chain including at least a component unit having an acidic group and a component unit having a hydroxyl group with an isocyanate compound having a hardenable reactive group, as measured by an IR absorption spectrum at a peak of $2,200\text{ cm}^{-1}$, is no longer present to form an intermediate product, preparing a solution by dissolving or dispersing the intermediate product in a coating solvent, and reacting with an alcohol having a boiling point with a 75°C or less difference with respect to the boiling point of the coating solvent and/or an evaporation rate with a $90(n\text{-BuOAc}=100)$ or less difference with respect to the evaporation rate of the coating solvent, wherein the alcohol is added to a reaction product and thereby reacting the alcohol with acid anhydride groups of the reaction product, wherein the acid anhydride groups are generated in the production method by dehydration of un-reacted acidic groups, before viscosity rise of the solution or before completion of viscosity rise of the solution.

107. (Previously Presented) The highly stable polymer according to claim 99, wherein the principal chain comprises at least a component unit represented by the below-mentioned formula (1) and a component unit represented by the below-mentioned formula (2):

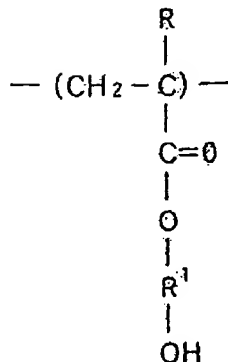
Formula (1)

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Formula (2)



wherein R is hydrogen or an alkyl group having 1 to 5 carbon atoms, and R¹ is an alkylene group having 2 to 4 carbon atoms.

108. (Previously Presented) The highly stable polymer according to claim 99, wherein the isocyanate compound has a reactive group other than the isocyanate group.

109. (Previously Presented) The highly stable polymer according to claim 108, wherein the isocyanate group is a radical polymerizable group-containing isocyanate compound.

110. (Currently Amended) The highly stable polymer according to claim 99, wherein the principal chain part of the highly stable resin is formed by polymerization of a compound having a double bond-containing group and an acidic functional group with a compound having a double bond-containing group and a hydroxyl group, using a non-nitrile ~~ase-based~~ azo-based polymerization initiator or a peroxide-based polymerization initiator.

111. (Previously Presented) The highly stable polymer according to claim 110,

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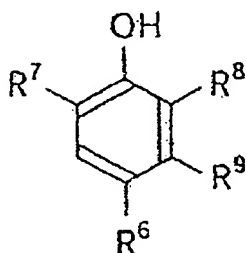
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wherein the light transmittance of a 3-methoxyl butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 400 nm is 60% or more.

112. (Previously Presented) The highly stable polymer according to claim 110, wherein the light transmittance of 3-methoxyl butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 360 nm is 50% or more.

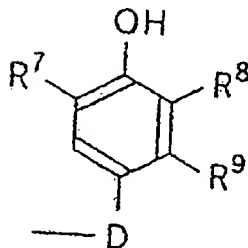
113. (Previously Presented) The highly stable polymer according to claim 99, wherein the isocyanate compound is introduced in the principal chain part of the highly stable resin, using a polymerization inhibitor selected from the group consisting of a phenol-based compound represented by the below-mentioned formula (10) and a phosphite-based compound represented by the below-mentioned formula (16):

Formula (10)



wherein R⁶ is hydrogen, an alkyl group having 1 to 5 carbon atoms, or the below-mentioned formula (11):

Formula (11)



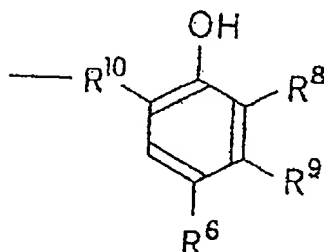
wherein D in the formula (11) is -S-, an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R⁷ is hydrogen or an alkyl group

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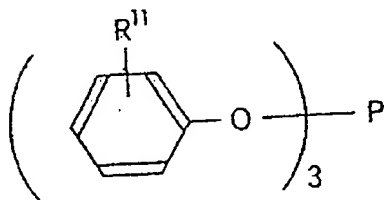
having 1 to 10 carbon atoms, R^8 is hydrogen, an alkyl group having 1 to 10 carbon atoms, or the below-mentioned formula (12):

Formula (12)



wherein R^{10} in the formula (12) is an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R^9 is hydrogen or an alkyl group having 1 to 10 carbon atoms however, at least one of R^7 and R^8 is a tert-butyl group, or an alkyl group having a cyclohexyl group, and substituents of the same numeral can either be same or different,

Formula (16)



wherein R^{11} is hydrogen or an alkyl group having 1 to 20 atoms.

114. (Previously Presented) The highly stable polymer according to claim 113, wherein the light transmittance of a 3-methoxyl butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 400 nm is 60% or more.

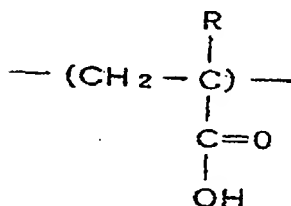
115. (Previously Presented) The highly stable polymer according to claim 113, wherein the light transmittance of a 3-methoxyl butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 360 nm is 50% or more.

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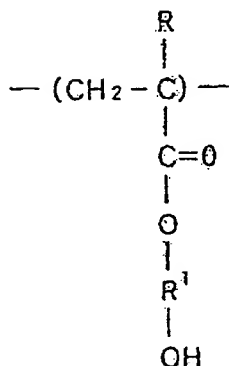
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116. (Previously Presented) The highly stable polymer according to claim 100, wherein the principal chain comprises at least a component unit represented by the below-mentioned formula (1) component unit represented by the below-mentioned formula (2):

Formula (1)



Formula (2)



wherein R is hydrogen or an alkyl group having 1 to 5 carbon atoms, and R¹ is an alkylene group having 2 to 4 carbon atoms.

117. (Previously Presented) The highly stable polymer according to claim 100, wherein the isocyanate compound has a reactive group other than the isocyanate group.

118. (Previously Presented) The highly stable polymer according to claim 117, wherein the isocyanate group is radical polymerizable group-containing isocyanate compound.

119. (Previously Presented) The highly stable polymer according to claim 100, wherein the principal chain part of the highly stable resin is formed by polymerization of a compound having a double bond-containing group and an acidic functional

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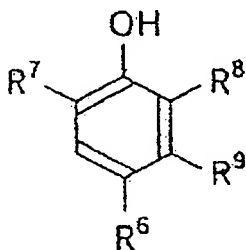
group with a compound having a double bond-containing group and a hydroxyl group, using a non-nitrile azo-based polymerization initiator or a peroxide-based polymerization initiator.

120. (Previously Presented) The highly stable polymer according to claim 119, wherein the light transmittance of a 3-methoxyl butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 400 nm is 60% or more.

121. (Previously Presented) The highly stable polymer according to claim 119, wherein the light transmittance of a 3-methoxyl butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 360 nm is 50% or more.

122. (Previously Presented) The highly stable polymer according to claim 100, wherein the isocyanate compound is introduced in the principal chain part of the highly stable resin, using a polymerization inhibitor selected from the group consisting of a phenol-based compound represented by the below-mentioned formula (10) and a phosphite-based compound represented by the below-mentioned formula (16):

Formula (10)

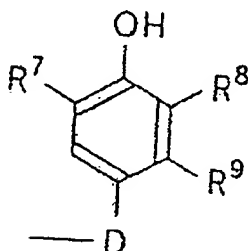


wherein R⁶ is hydrogen, an alkyl group having 1 to 5 carbon atoms, or the below-mentioned formula (11):

Formula (11)

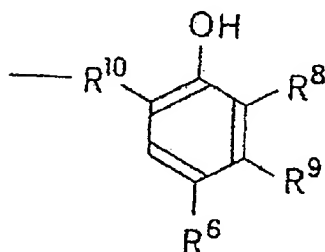
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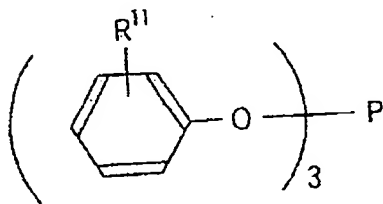
wherein D in the formula (11) —S—, an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R^7 is hydrogen or an alkyl group having 1 to 10 carbon atoms, R^8 is hydrogen, an alkyl group having 1 to 10 carbon atoms, or the below-mentioned formula (12):

Formula (12)



wherein R^{10} in the formula (12) is an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R^9 is hydrogen or an alkyl group having 1 to 10 carbon atoms however, at least one of R^7 and R^8 is a tert-butyl group, or an alkyl group having a cyclohexyl group, and substituents of the same numeral can either be same or different,

Formula (16)



wherein R^{11} is hydrogen or an alkyl group having 1 to 20 carbon atoms.

123. (Previously Presented) The highly stable polymer according to claim 122, wherein the light transmittance of a 3-methoxyl butyl acetate solution of a 20% by

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weight resin solid component placed in a 1 cm square quartz cell at 400 nm is 60% or more.

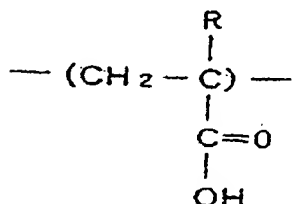
124. (Previously Presented) The highly stable polymer according to claim 122, wherein the light transmittance of a 3-methoxyl butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 360 nm is 50% or more.

125. (Previously Presented) The hardenable resin composition according to claim 104, wherein the hardenable polymer is obtained by reacting the polymer with the isocyanate compound and the alcohol, and further being left or heated for a predetermined time for maturation.

126. (Previously Presented) The hardenable resin composition according to claim 104, containing as the essential component the hardenable polymer dissolved or dispersed in a coating solvent, wherein the hardenable polymer is obtained by reacting the polymer with the isocyanate compound, and further reacting the same with, an alcohol having a boiling point with a 75°C or less difference with respect to the boiling point of the coating solvent to be used and/or an evaporation rate with a 90 (n-BuOAc=100) or less difference with respect to the evaporation rate of the coating solvent.

127. (Previously Presented) The hardenable resin composition according to claim 104, wherein, the principal chain of the polymer comprises at least a component unit represented by the below-mentioned formula (1) and a component unit represented by the below-mentioned formula (2):

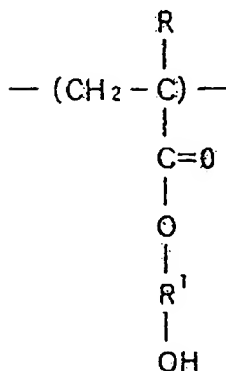
Formula (1)



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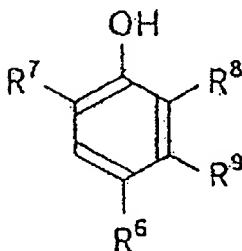
Formula (2)



wherein R is hydrogen or an alkyl group having 1 to 5 carbon atoms, and R¹ is an alkylene group having 2 to 4 carbons atoms, and the isocyanate compound is a radical polymerizable group-containing isocyanate compound.

128. (Previously Presented) The hardenable resin composition according to claim 104, wherein the polymer is formed by polymerization of a compound having a double bond-containing group and an acidic functional group with a compound having a double bond-containing group and a hydroxyl group, using a non-nitrile azo-based polymerization initiator or a peroxide-based polymerization initiator, and the polymer is reacted with the isocyanate compound, using a polymerization inhibitor selected from the group consisting of a phenol-based compound represented by the below-mentioned formula (10) and a phosphite-based compound represented by the below-mentioned formula (16):

Formula (10)

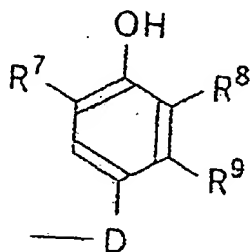


wherein R⁶ is hydrogen, an alkyl group having 1 to 5 carbon atoms, or the below-mentioned formula (11):

Formula (11)

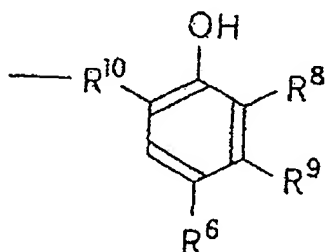
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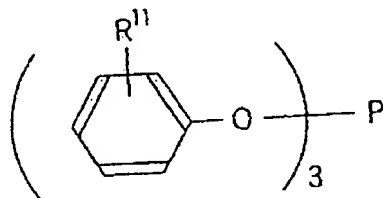
wherein D in the formula (11) is $-S-$, an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R^7 is hydrogen or an alkyl group having 1 to 10 carbon atoms, R^8 is hydrogen, an alkyl group having 1 to 10 carbon atoms, or the below-mentioned formula (12):

Formula (12)



Wherein R^{10} in the formula (12) is an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R^9 is hydrogen or an alkyl group having 1 to 10 carbon atoms, however, at least one of R^7 and R^8 is a tert-butyl group, or an alkyl group having a cyclohexyl group, moreover, substituents of the same numeral can either be same or different,

Formula (16)



wherein R^{11} is hydrogen or an alkyl group having 1 to 20 carbon atoms.

129. (Previously Presented) The hardenable resin composition according to claim 128, wherein the hardenable resin polymer has a light transmittance of a 3-methoxy butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm

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square quartz cell at 400 nm being 60% or more.

130. (Previously Presented) The hardenable resin composition according to claim 128, wherein the hardenable resin polymer has a light transmittance of a 3-methoxy butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 360 nm being 50% or more.

131. (Currently Amended) The hardenable resin composition according to claim 104, containing as the essential component the highly stable polymer ~~obtainable~~ obtained by reacting the alcohol before viscosity rise of a reaction liquid obtained by reacting the isocyanate compound or before completion of viscosity rise of the solution.

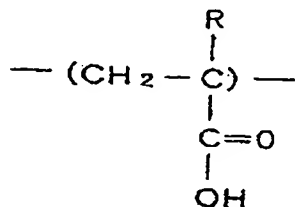
132. (Currently Amended) A highly stable polymer comprising a polymer ~~obtainable~~ obtained by reacting a polymer having a principal chain including at least a component unit having an acidic group and a component unit having a hydroxyl group with an isocyanate compound until an isocyanate group, as measured by an IR absorption spectrum at a peak of $2,200\text{cm}^{-1}$, is no longer present, and then adding an alcohol of 10 to 120 parts by weight, with respect to 100 part by weight of an intermediate product obtained thereby, to a reaction product, before viscosity rise of the solution or before completion of viscosity rise of the solution, and thereby reacting the alcohol with acid anhydride groups of the reaction product, wherein the acid anhydride groups are generated in the production method by dehydration of unreacted acidic groups.

133. (Previously Presented) The highly stable polymer according to claim 132, wherein the principal chain comprises at least a component unit represented by the below-mentioned formula (1) and a component unit represented by the below-mentioned formula (2):

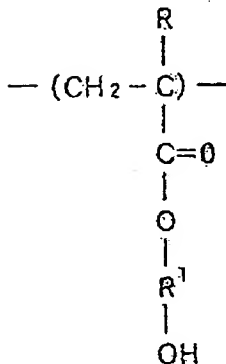
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Formula (2)



wherein R is hydrogen or an alkyl group having 1 to 5 carbon atoms, and R¹ is an alkylene group having 2 to 4 carbon atoms.

134. (Previously Presented) The highly stable polymer according to claim 132, wherein the isocyanate compound had a reactive group other than the isocyanate group.

135. (Previously Presented) The highly stable polymer according to claim 134, wherein the isocyanate group is a radical polymerizable group-containing isocyanate compound.

136. (Previously Presented) The highly stable polymer according to claim 132, wherein the principal chain part of the highly stable resin is formed by polymerization of a compound having a double bond-containing group and an acidic functional group with a compound having a double bond-containing group and a hydroxyl group, using a non-nitrile azo-based polymerization initiator or a peroxide-based polymerization initiator.

137. (Previously Presented) The highly stable polymer according to claim 136,

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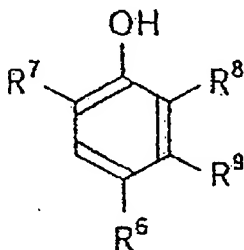
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wherein the light transmittance of a 3-methoxy butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 400 nm is 60% or more.

138. (Previously Presented) The highly stable polymer according to 136, wherein the light transmittance of a 3-methoxy butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell 360 nm is 50% or more.

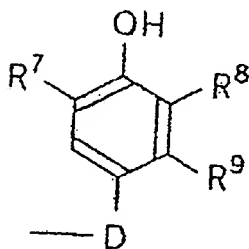
139. (Previously Presented) The highly stable polymer according to claim 132, wherein the isocyanate compound is introduced in the principal chain part of the highly stable resin, using a polymerization inhibitor selected from the group consisting of a phenol-based compound represented by the below-mentioned formula (10) and a phosphite-based compound represented by the below-mentioned formula (16):

Formula (10)



wherein R⁶ is hydrogen, an alkyl group having 1 to 5 carbon atoms, or the below-mentioned formula (11):

Formula (11)



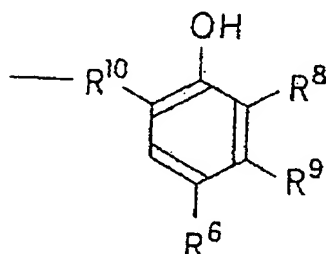
wherein D in the formula (11) is -S-, an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R⁷ is hydrogen or an alkyl group having 1 to 10 carbon atoms, R⁸ is hydrogen, an alkyl group having 1 to 10 carbon

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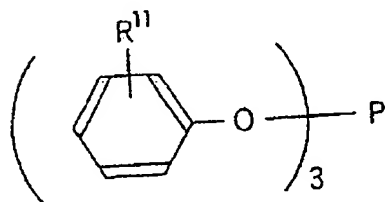
atoms, or the below-mentioned formula (12):

Formula (12)



wherein R^{10} in the formula (12) is an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R^9 is hydrogen or an alkyl group having 1 to 10 carbon atoms however, at least one of R^7 and R^8 is tert-butyl group, or an alkyl group having a cyclohexyl group, and substituents of the same numeral can either be same or different,

Formula (16)



wherein R^{11} is hydrogen or alkyl group having 1 to 20 carbon atoms.

140. (Previously Presented) The highly stable polymer according to claim 139, wherein the light transmittance of a 3-methoxy butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 400 nm is 60% or more.

141. (Previously Presented) The highly stable polymer according to claim 139, wherein the light transmittance of a 3-methoxy butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 360 nm is 50% or more.

142. (Currently Amended) A hardenable resin composition containing as the

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essential component a highly stable polymer obtainable obtained by reacting a polymer having a principal chain including at least a component unit having an acidic group and a component unit having a hydroxyl group with an isocyanate compound having a hardenable reactive group until an isocyanate group, as measured by an IR absorption spectrum at a peak of $2,200\text{cm}^{-1}$, is no longer present, and then reacting the same with an alcohol of 10 to 120 parts by weight, with respect to 100 parts by weight of an intermediate product obtained thereby, before viscosity rise of the solution or before completion of viscosity rise of the solution, and thereby reacting the alcohol with acid anhydride groups of the reaction product, wherein the acid anhydride groups are generated in the production method by dehydration of un-reacted acidic groups.

143. (Previously Presented) The hardenable resin composition according to claim 142, wherein the hardenable polymer is obtained by reacting the polymer with the isocyanate compound and the alcohol, and further being left or heated for a predetermined time for maturation.

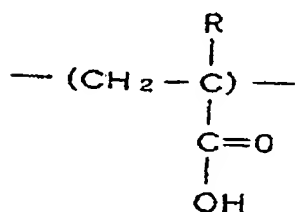
144. (Previously Presented) The hardenable resin composition according to claim 142, containing as the essential component the hardenable polymer dissolved or dispersed in a coating solvent, wherein the hardenable polymer is obtained by reacting the polymer with the isocyanate compound, and further reacting the same with an alcohol having a boiling point with a 75°C or less difference with respect to the boiling point of the coating solvent to be used and/or an evaporation rate with a 90 (n-BuOAc=100) or less difference with respect to the evaporation rate of the coating solvent.

145. (Previously Presented) The hardenable resin composition according to claim 142, wherein the principal chain of the polymer comprises at least a component unit represented by the below-mentioned formula (1) and a component unit represented by the below-mentioned formula (2):

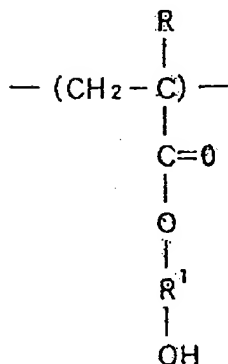
Formula (1)

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Formula (2)



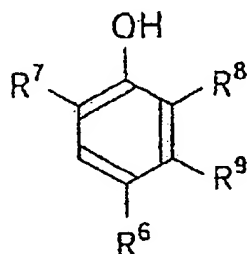
wherein R is hydrogen or an alkyl group having 1 to 5 carbon atoms, and R¹ is an alkylene group having 2 to 4 carbon atoms, and the isocyanate compound is a radical polymerizable group-containing isocyanate compound.

146. (Previously Presented) The hardenable resin composition according to claim 142, wherein the polymer is formed by polymerization of a compound having a double bond-containing group and an acidic functional group with a compound having a double bond-containing group and a hydroxyl group, using a non-nitrile azo-based polymerization initiator or a peroxide-based polymerization initiator, and the polymer is reacted with the isocyanate compound, using a polymerization inhibitor selected from the group consisting of a phenol-based compound represented by the below-mentioned formula (10) and a phosphite-based compound represented by the below-mentioned formula (16):

Formula (10)

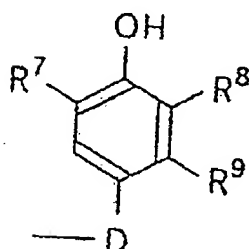
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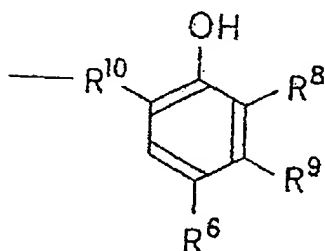
wherein R^6 is hydrogen, an alkyl group having 1 to 5 carbons atoms, or the below-mentioned formula (11):

Formula (11)



wherein D in the formula (11) is $-S-$, an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R^7 is hydrogen or an alkyl group having 1 to 10 carbons atoms, R^8 is hydrogen, an alkyl group having 1 to 10 carbon atoms, or the below-mentioned formula (12)

Formula (12)

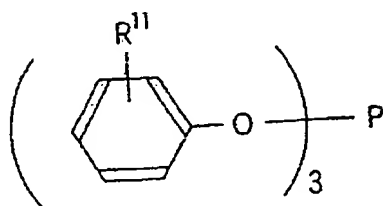


wherein R^{10} in the formula (12) is an alkylene group having 1 to 10 carbon atoms or an alkylidene group having 1 to 10 carbon atoms, R^9 is hydrogen or an alkyl group having 1 to 10 carbon atoms, however, at least one of R^7 and R^8 is a tert-butyl group, or an alkyl group having a cyclohexyl group, moreover, substituents of the same numeral can either be same or different,

Formula (16)

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wherein R^{11} is hydrogen or an alkyl group having 1 to 20 carbon atoms.

147. (Previously Presented) The hardenable resin composition according to claim 146, wherein the hardenable resin polymer has a light transmittance of a 3-methoxy butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 400 nm being 60% or more.

148. (Previously Presented) The hardenable resin composition according to claim 146, wherein the hardenable resin polymer has a light transmittance of a 3-methoxy butyl acetate solution of a 20% by weight resin solid component placed in a 1 cm square quartz cell at 360 nm being 50% or more.